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Economic Analysis of Effluent Limitations Guidelines and Standards for the Centralized Waste Treatment Industry

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SECTION 1
EXECUTIVE SUMMARY

1.1 INTRODUCTION

This report estimates the economic and financial effects and the benefits of compliance with the proposed effluent limitations guidelines and standards for the Centralized Waste Treatment (CWT) industry. The Environmental Protection Agency (EPA) has measured these impacts in terms of changes in the profitability of waste treatment operations at CWT facilities, changes in market prices of CWT services, and changes in the quantities of waste managed at CWT facilities in six geographic regions. EPA has also examined the impacts on companies owning CWT facilities (including impacts on small entities), on communities in which CWT facilities are located, and on environmental justice.

EPA examined the benefits to society of the CWT effluent limitations guidelines and standards by examining cancer and non-cancer health effects of the regulation, recreational benefits, and cost savings to publicly owned treatment works (POTWs) to which indirect-discharging CWT facilities send their wastewater.

EPA also conducted an analysis of the cost-effectiveness of the regulatory options, which was published separately in a report entitled, "Cost-Effectiveness of Proposed Effluent Limitations Guidelines and Standards for the Centralized Waste Treatment Industry."

The effluent limitations guidelines and standards will directly impact the costs and pollutant discharges of CWT facilities that discharge wastewater directly or indirectly to surface water. To estimate these impacts, EPA gathered data on CWT facilities, the companies that own them, the communities in which they are located, the waterbodies into which they discharge, and the populations exposed to their effluent. Section 1.2 describes the data used for the analysis.

1.2 SOURCES OF DATA

In 1990, EPA distributed a questionnaire to a census of 452 CWT facilities under the authority of Section 308 of the Clean Water Act. The questionnaire requested both technical and economic information from the CWT facilities. Technical data collected by the questionnaire characterized the quantities of waste accepted off-site into the waste treatment and recovery operations at each facility, the treatment technologies in place at baseline, and the baseline pollutant releases. The economic and financial section of the questionnaire (shown in Appendix A) characterized the facility CWT costs, revenues, and profits, RCRA permitting costs, commercial status, employment, and company ownership. Based on the responses to the questionnaire, EPA proposed effluent limitations guidelines and standards for the industry in 1995. Comments on the proposed rule led the Agency to reexamine the scope of the regulation and to consider several additional control technologies. Of critical importance was the identification of a large number of oil recovery facilities that EPA believed should be in scope of the regulation. Thus, EPA modeled their oil recovery operations and estimated the impacts on these facilities of complying with the 1995 proposal. This information was published in the Federal Register in a Notice of Data Availability in 1996. Comments on the NOA, together with the comments on the proposed rule, led EPA to decide to repropose effluent limitations guidelines and standards. This report analyzes the costs, impacts, and benefits of the reproposed rule. The analysis is based on data for 145

CWT facilities that provided data, and is scaled up to reflect the estimated universe of 205 CWT facilities.

To conduct these analyses, EPA employed the questionnaire data for facilities included in the 1995 proposal, modeled facility data as amended to reflect the comments received on the NOA for the newly included oil recovery facilities, together with publicly available information on the companies owning CWT facilities, the populations and demographic characteristics of the communities in which they are located, the characteristics of the waterbodies into which their effluent is discharged, and the characteristics of populations exposed to their effluent.

1.3 PROFILE OF THE INDUSTRY

EPA estimates that in 1995, there were 205 CWT facilities that accepted waste from off-site generators for treatment or recovery. The wastes sent to CWT facilities tend to be concentrated and difficult to treat, and include process residuals, process wastewater, and process wastewater treatment residuals such as treatment sludges. CWT facilities discharge high concentrations of some pollutants either into surface water or to POTWs. Of these 205, all but four accept at least some waste on a commercial basis. Fifty-nine facilities accept metals waste for treatment or recovery, 164 accept oily waste for treatment or recovery, and 25 accept organic waste for treatment or recovery. Of the 205 facilities, 14 are direct dischargers, 147 are indirect dischargers, and 44 are zero dischargers.

The demand for CWT services comes from manufacturing plants in many industries, whose manufacturing activities produce not only output but also waste. Much of this demand has resulted from increasingly stringent environmental regulations affecting the generator facilities. Rather than develop the waste management expertise themselves, many generators have chosen to rely on the services of waste management professionals. In recent years, the

emphasis on waste minimization and pollution prevention has resulted in an overall decrease in the quantity of waste sent off-site for treatment and/or recovery, according to data from EPA's Toxics Release Inventory. Because for CWT services are limited, EPA assumes elasticities of demand that range from -0.5 to -1.5.

Table 1-1 shows the baseline quantities of waste managed in each of the five types of commercial CWT operations analyzed by EPA. The largest number of facilities and the largest quantities of waste managed are in the oils subcategory. Overall, EPA estimates that CWT facilities accepted approximately 2.2 billion gallons of waste from off-site in 1995.

TABLE 1-1. BASELINE NUMBER OF CWT FACILITIES AND BASELINE QUANTITIES OF WASTE FOR COMMERCIAL CWTS, 1995

	Number of Facilities	Total Quantity (10^3 gal/yr)
Metals Recovery	7	11,112
Metals Treatment	53	554,413
Oils Recovery	152	746,081
Oils Treatment	145	756,296
Organics Treatment or Recovery	25	95,267

Commercial CWT facilities are located throughout the U.S. Based on the characteristics of wastewater, and information provided by CWTs about the location of their customers, EPA assumed markets for CWT services were regional, and defined markets in six geographic regions which are assumed in the model to be completely independent. The markets are further subdivided by baseline waste treatment costs, assuming that treatment cost differences reflect differences in the types of waste being treated or recovered. The number of CWT facilities offering a particular type of CWT service in a region varies from

zero to 31. Depending on the number of CWT facilities in a specific waste treatment or recovery market, market structure is modeled as monopoly, duopoly, or perfect competition.

Company data are available for 100 of the 145 facilities providing data. These 100 facilities are owned by 73 companies. For the remaining 43 CWT facilities, EPA assumed that company revenues and costs are equal to the revenues and costs from their CWT operations. These 43 CWT facilities are owned by 40 companies. The company-level analysis is based on 113 companies. After scaling up, EPA estimates that the 205 CWT facilities are owned by 164 companies. Of these, half (62) have revenues less than $6 million, and are therefore characterized as small businesses. It should be noted that the assumption that company revenues are equivalent to CWT revenues for the 40 companies without company data may understate their revenues and therefore overstate the number of small businesses. At baseline, companies owning CWTs are generally profitable, although 14 companies are unprofitable.

EPA also examined the baseline environmental impacts of the CWT industry. Over 120 hazardous chemical compounds have been detected in the discharges from the 119 CWT facilities whose discharges were modeled. The pollutants include metals such as arsenic, chromium, and lead, and organic compounds such as benzene and toluene. Of the 128 pollutants detected at baseline, four are known human carcinogens and another 17 are considered probable or possible carcinogens. Almost half of the pollutants are systemic toxicants for humans, and nearly all are considered hazardous to aquatic life.

To analyze water quality impacts, EPA characterized the reaches into which CWT pollutants are discharged. Of 83 reaches modeled, 78 are in urban areas, and 22 have fish consumption advisories in effect.

1.4 ANNUALIZED COSTS OF COMPLIANCE

EPA is proposing effluent limitations guidelines and standards for direct discharging CWT facilities based on Best Practicable Control Technology Currently Available (BPT), Best Conventional Pollutant Control Technology (BCT), Best Available Technology that is Economically Achievable (BAT), New Source Performance Standards (NSPS) based on the best available control technology that can be demonstrated. For indirect dischargers, EPA is proposing Pretreatment Standards for Existing Sources (PSES) and Pretreatment Standards for New Sources (PSNS). EPA examined three control options to reduce the discharge of pollutants from the metals subcategory of the CWT industry, which are referred to as Metals Options 2, 3, and 4. Option 4, which includes batch precipitation, liquid-solid separation, secondary precipitation, and sand filtration, is being proposed as BPT. EPA also examined three control options for cyanide destruction, and EPA is proposing Cyanide Option 2 (alkaline chlorination at specific operating conditions). EPA examined four control options to reduce the discharge of pollutants from the oils subcategory. EPA is proposing BPT, BCT, PSNS, NSPS, and BAT controls based on Oils Option 9, secondary gravity separation and dissolved air flotation (DAF). For indirect dischargers in the Oils subcategory, EPA is proposing PSES based on Oils Option 8, dissolved air flotation, because it is less costly than Option 9 and results in fewer adverse economic impacts. EPA examined two control options to reduce the discharge of pollutants from the organics subcategory, and is proposing controls based on Organics Option 4, equalization and biological treatment, for the organics subcategory.

Complying with the proposed regulation will increase the costs of CWT facilities. EPA estimated lump-sum capital, land, and RCRA permit modification costs and annual operating, maintenance, monitoring, and record-keeping costs. Table 1-2 shows the costs of complying with the proposed regulatory option. Annualized costs are show both before and

TABLE 1-2. COSTS OF COMPLYING WITH THE COMBINED REGULATORY OPTION (10^6 $1997)[a]

Costs	Total Lump-Sum Costs	Total Annualized Costs Before-Tax Savings	Total After-Tax Annualized Costs[b]
BPT/BAT Costs	4.56	3.56	2.2
PSES Costs	40.3	24.3	13.4
Total Costs	44.9	27.9	15.6

[a] Costs are scaled up to reflect the estimated universe of CWT facilities.
[B]Costs include the cost of modifying RCRA permit where appropriate.

after accounting for tax savings associated with investments in capital equipment and operating costs.

1.5 FACILITY IMPACTS

EPA analyzed the impacts of these costs on affected CWT facilities using a mathematical model of the facilities and regional CWT markets. Complying with the proposed regulatory option increases the cost of direct and indirect discharging CWT facilities. They respond by increasing the prices at which they accept waste. Overall, the prices of CWT services increase and the quantity of waste accepted by CWTs decreases. The increased prices for CWT services results in higher revenues for CWT facilities. EPA computed the profitability of each CWT operation based on the estimated increases in CWT costs and revenues. Operations for which estimated with-regulation costs exceed estimated with-regulation revenues are unprofitable, and are assumed to shut down. If all the affected CWT operations at a facility are estimated to shut down, EPA considers this a facility closure. Table 1-3 shows the estimated process and facility closures by discharge status.

TABLE 1-3. PROCESS AND FACILITY CLOSURES AT CWT FACILITIES, BY DISCHARGE STATUS[a]

Discharge Status	Process Closures	Percentage	Facility Closures	Percentage
Direct Dischargers	1	4.17%	2	18.2%
Indirect Dischargers	15	5.55%	13	8.9%
Zero Dischargers	0	0.0%	0	0.0%

[a] Data are scaled up to account for the entire universe of CWT facilities.

EPA estimates that nationwide, 338 jobs will be lost at CWT facilities experiencing reductions in CWT operations or closures of processes or facilities. This reduction in employment is expected to be partially offset by the increases in employment required to operate the controls at affected CWTs. EPA estimates that 97 full-time equivalent employees will be required to operate the controls, which would offset more than a third of the projected job losses from market adjustments.

1.6 FIRM IMPACTS

EPA analyzed impacts on firms owning CWT facilities by analyzing changes in company profits and return on investment. For 64 companies, profit margins declined as a result of the regulation. Thirty-four of the companies experiencing lower profit margins are small firms. For 42 companies, profit margins increased, because their revenues are projected to increase by more than their costs. Twenty of the 42 companies projected to experience increased profit margins are small firms. Finally, three companies are projected to experience no change in their profit margins due to the regulation.

1.7 COMMUNITY IMPACTS

EPA measures impacts on communities in which CWT facilities are located by estimating the change in community employment that is projected to result from the regulation. CWT facilities that reduce the quantity of waste they treat, close processes, or close CWT operations completely, are estimated to experience reduced employment. This reduction in employment is projected to result in additional employment losses in the community as the displaced CWT employees reduce their spending, and this generates additional job losses. EPA made the most conservative assumption, that all job losses would occur within the community where the CWT is located. Seventy-two communities are projected to experience no change in employment or an increase in employment. Thirty-seven communities are projected to experience a decline in employment of less than 0.2 percent. No community is projected to experience a loss in employment of more than 0.9 percent of baseline employment.

EPA also examined the demographic characteristics of the communities in which CWT facilities were located, to assess the distributional and environmental justice impacts of the regulation. Perhaps because many CWTs are located in industrial urban areas, populations in the communities in which they are located have, on average, higher proportions of low income residents and people of color than the states in which they are located or the country as a whole. EPA examined community employment impacts to ensure that communities of color and relatively low-income communities are not experiencing disproportionately high impacts. Of the 42 communities experiencing more than one job loss, 30 are predominantly low-income or minority. However, the employment losses are at most 0.51 percent of baseline employment, so EPA does not believe that significant adverse employment impacts will occur in communities of color or communities with a relatively large share of poor residents.

To assess the environmental justice impacts of the CWT regulation, EPA examined the benefits experienced by communities adjacent to the surface water bodies into which CWT facilities discharge their wastewater. These are largely, but not entirely, the same as the communities in which the CWT facilities are located. EPA assumed that all the benefits of the regulation are experienced by residents of the counties adjacent to the reaches projected to be less polluted due to the regulation. Seventeen of the 32 communities with relatively high minority or low income populations are projected to experience quantified benefits due to the regulation. Thus, the CWT effluent limitations guidelines and standards are projected to improve environmental justice, by reducing the exposure of these communities' populations to pollutants discharged by CWTs.

1.8 INITIAL REGULATORY FLEXIBILITY ANALYSIS

EPA's initial assessment of the possible impact of options being considered on small CWT companies showed that some options might have significant impacts on some small CWT companies. Thus, EPA performed an initial regulatory flexibility analysis (IRFA) and convened a Small Business Advocacy Review (SBAR) panel to collect the advice and recommendation of small entity representatives (SERs) of CWT businesses that would be affected by the proposal. EPA estimates that 82 companies owning CWTs have revenues less than $6 million per year, and are considered small companies for this analysis. Of these, 63 own discharging CWT facilities and may incur increased costs due to the regulation. EPA has evidence that the number of affected small businesses may be overstated, because of trends in the CWT industry since the data were collected. However, these data are the most complete available for these companies and are consistent with the technical and economic characterization used in the analysis.

EPA considered a number of measures to mitigate the impact of the proposed rule on small businesses, including relief from monitoring requirements and other regulatory relief

for oily waste treaters, and a less stringent NSPS for the metals subcategory. In addition, EPA considered three general options that would mitigate the impacts of the regulation on small entities. First, EPA proposed regulatory options that were in the form of effluent limitations guidelines and standards, not specific requirements for design, equipment, work practice, or operational standards. Second, the Agency considered less stringent control options for each of the treatment subcategories than were originally proposed in 1995. Third, EPA selected a technology basis for pretreatment standards for the oils subcategory that generally provides less stringent standards than the technology basis for the proposed BAT limitations.

Of the 56 small companies for which EPA has reliable data on baseline profits, 42 own indirect discharging facilities. Ten of these are projected to experience increasing profit margins as a result of the proposed regulatory option, and 32 are projected to experience decreased profit margins. Overall, small companies are projected to fare better than either medium sized or large companies. EPA also examined the potential impacts of the regulatory relief options, and concludes that the analysis does not support the need for a limitation. EPA is concerned that, by limiting the scope of the proposed rule based on one of the regulatory relief scenarios, EPA might actually be encouraging ineffective treatment at the expense of effective treatment. Thus, despite considering a variety of potential limitations to mitigate small business impacts while still preserving the benefits of the rule, EPA was unable to identify a single effective solution to incorporate into the proposal.

1.9 COST-BENEFIT ANALYSIS

EPA examined the costs and benefits to society of the proposed effluent limitations guidelines and standards. The social costs are defined as the change in consumer and producer surplus as a result of the regulation. Table 1-4 summarizes the estimated social costs of the regulation. It should be noted that “consumer” in this case actually means

TABLE 1-4. ESTIMATED AGGREGATE COST TO CONSUMERS AND PRODUCERS

Social Cost Component	Change in Value (10^3 1997)
Change in Consumer Surplus	-$24,743
Change in Producer Surplus	$4,654
Sum of Changes in Consumer and Producer Surplus	-$20,089

customer, because CWT services are intermediate goods, sold to producers of other goods and services.

The Agency estimates that, overall, producers and consumers of CWT services will lose approximately $20 million in social welfare as a result of the proposed regulation. EPA's analysis indicates that, overall, the industry will experience increased profits as a result of the regulation, but that this will be more than offset by the increased costs incurred by customers, due to the increased prices charged for CWT services.

Because the market model analyzes impacts based on after-tax costs of compliance, the above values do not include all of the social costs of the proposed rule. In particular, they do not include the costs to government. EPA estimates government's share of the costs of the proposed rule to be approximately $12 million. Thus, the total cost of the proposed rule is estimated to be approximately $32 million.

The proposed effluent limitations guidelines and standards for the CWT industry would reduce pollutant discharges to surface water by approximately 14.3 million pounds per year of conventional pollutants and 4.1 million pounds per year of toxic and nonconventional pollutants. This reduction in pollutant loadings will lead to improvements in both the

instream water quality and the health of ecological systems in the affected waterbodies. In addition, POTWs are expected to experience reductions in sludge disposal costs.

To estimate the benefits of the proposed effluent limitations guidelines and standards, EPA first estimated the changes in ambient water quality and related ecosystems that would result from the reduction in releases. Then, EPA estimated and valued reductions in cancer and non-cancer health effects, improvements in recreational fishing, and cost savings for POTWs. Table 1-5 summarizes the EPA's benefits estimates.

TABLE 1-5. ANNUAL BENEFITS OF THE PROPOSED EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS

Benefits Category	Estimated Range of Benefits (10^3 1997)
Reduction in Cancer Incidence from Fish Consumption	$1,492,000 – $8,043,000
Reduction in Lead-Related Health Effects from Fish Consumption	$2,999,000 – $5,242,000
Recreation Value of Reducing AWQC Exceedances	$414,000 – $1,177,000
Reductions in Sludge Disposal Costs	$149,400 – $928,100
Sum of These Benefits Categories	$5,054,400 – $15,390,100

There are uncertainties and limitations inherent in both the estimated costs and benefits, which may have led to either underestimating or overestimating their values. More important than these uncertainties for the benefits estimation is the fact that data limitations prevented EPA from quantifying or valuing many other categories of benefits, including benefits to near-stream recreation, commercial fishing, and diversionary users of affected waterbodies, as well as nonuse benefits. The Agency is certain that the benefits estimates in Table 1-5 are only a subset of total benefits. Thus, EPA is confident that the benefits of the proposed regulation justify its costs.

SECTION 2
DATA SOURCES

EPA collected the data used to profile the CWT industry and to analyze the impacts of the effluent limitations guidelines and standards from a variety of sources. These include a census of the industry conducted in 1991, comments on the original proposal and the Notice of Data Availability (NOA), the Toxics Release Inventory (TRI) database (EPA, 1991-1995), and publicly available information, such as financial databases. This section describes the data sources and how they were combined to provide a baseline characterization of the CWT industry and markets. Appendix A provides additional detail about the data sources.

2.1 DATA FROM THE WASTE TREATMENT INDUSTRY QUESTIONNAIRE

In 1991, EPA collected data from facilities believed to be in the CWT industry through the Waste Treatment Industry Questionnaire (henceforth to be referred to as the questionnaire) (EPA, 1991).[1] The questionnaire collected technical information for 1989 and economic information for 1987, 1988, and 1989 under authority of Section 308 of the Clean Water Act (CWA). Of the 452 facilities receiving the questionnaire, EPA determined that 363 did not treat or recover materials from industrial waste received from off-site. Of the 89 that did treat or recover materials from industrial waste received from off-site, four facilities were considered out of scope because they received off-site waste only through a

[1]Appendix A of EPA (1995) contained a copy of the questionnaire instrument. It is also included in Appendix A of this report, along with a copy of the Facility Information Sheet provided to each NOA facility with EPA's estimated data for that facility.

pipeline from adjacent facilities. The remaining 85 facilities were ultimately determined to be within the scope of the proposed effluent limitations guidelines and standards.

Technical data collected from these facilities included the quantities of waste they received from off-site for management in various CWT operations, current treatment technologies, and current releases.

Economic and financial data collected from these facilities included

- prices for wastewater treatment of different waste types,
- facility employment,
- costs and revenues for each CWT operation,
- information on commercial status of CWT operations at the facility,
- Resource Conservation and Recovery Act (RCRA) permit modification costs, and
- limited financial information for the companies owning the CWT facilities.

Most respondents provided data for the years requested: 1987, 1988, and 1989. However, some facilities had not been in operation during a part of that period, so they provided data for other years. The Agency conducted a careful review of the responses to ensure that the data used to develop the effluent limitations guidelines and standards were as complete and accurate as possible.

2.1.1 Data Modifications and Corrections

The Agency's quality assurance/quality control for the questionnaire data involved several discrete steps: reviewing the questionnaire responses for completeness and internal consistency, contacting the facilities for additional information or clarification, comparing

responses from the technical and economic sections of the questionnaire, and adjusting the data to make the economic and financial data consistent with the technical data.

The Agency reviewed the individual questionnaire responses to ensure that they were complete and internally consistent. EPA contacted facilities to verify and correct responses that were either incomplete or appeared incorrect. After completing this quality assurance/ quality control procedure, the Agency made further adjustments to correct for remaining discrepancies in the data. These adjustments required

- matching the time period for the technical data and the time period for the economic data as closely as possible;
- reassigning costs and revenues for waste treatment operations so that they matched the waste treatment operations reported in the technical section of the questionnaire; and
- adjusting economic data reported to the base year of the analysis, using the producers price index.

In addition, five facilities did not respond to the economic and financial section of the questionnaire. Cost data were generated for these facilities, based on a simple statistical analysis of data for facilities that had responded. Revenues were generated by multiplying the price of the services offered times the quantities they reported in the technical sections of their questionnaires.

Since proposal, EPA has made substantial changes to the scope of the regulation. Section IV of the preamble to the proposed rule discusses these changes. The Agency has determined that several other facilities that were considered in scope for the 1995 proposal are no longer in scope, because they no longer conduct CWT operations. These were removed from the analytical database.

When these adjustments were complete, the Agency had a database of information for 76 facilities that included quantities and flows of waste within the CWTs from the technical section of the 1991 questionnaire and associated costs, revenues, and employment at the CWTs from the economic questionnaire.

2.1.2 Additions to Data Since Original Proposal (NOA Facilities)

Comments on the proposed rule indicated that a large number of oil recovery facilities, which had been considered out of scope for the proposal, were in fact subject to the regulation. To analyze the impacts of the proposed regulation on these facilities, the Agency developed baseline data for these facilities using the following data: publicly available facility employment data, data for similar facilities from the questionnaire, and information provided by the National Association of Oil Recyclers (NORA), an industry trade association. The Agency estimated waste flows at the facilities, baseline costs and revenues for oil recovery and oily wastewater treatment, and costs to comply with the effluent limitations guidelines and standards and then analyzed the economic impacts of the proposed rule on these facilities. The results of these analyses were published in the *Federal Register* in a NOA (EPA, 1996). To ensure that all the subject facilities were aware of the information and had the opportunity to comment on the data (and correct any errors), the Agency prepared Facility Information Sheets describing the data used for each facility and sent them to the oil recycling facilities.[2] Many of the facilities responded to the NOA with comments and corrections. Based on the data received, the Agency identified 69 oil recovery facilities that were subject to the regulation. For these, the Agency has data on the quantity of oily waste and oily wastewater accepted from off-site, quantity of oil recovered, quantity of wastewater discharged, facility operating costs and revenues, and employment. The data used are those

[2]Appendix A of this document contains a copy of the Facility Information Sheet form mailed to each facility to inform them of the NOA and the data being used to characterize their facility.

generated to analyze the economic impacts of the proposed effluent limitations guidelines and standards for the NOA, as amended by commenters.

2.2 DATA SOURCES FOR DEMAND CHARACTERIZATION

Data to characterize the demand for CWT services come primarily from the TRI, an annual EPA data collection effort that reports quantities of toxic chemicals released by manufacturing facilities. Among other types of releases, the generating facilities are asked to report quantities of waste sent off-site for treatment or recovery.

2.3 DATA SOURCES FOR MARKET CHARACTERIZATION

Data used for the market characterization comprise the data from the 1991 Waste Treatment Industry Questionnaire and data from the NOA database. Facilities were assigned to markets based on their locations, the types of CWT operations on-site, and the per-gallon costs of treatment or recovery for those operations. Depending on the number of facilities in each market, the markets were characterized as monopolistic (one CWT service provider), duopolistic (two CWT service providers), or perfectly competitive (three or more CWT service providers).

2.4 DATA SOURCES FOR COMPANY ANALYSIS

Data were collected from several sources to profile the companies owning the CWT facilities. These sources included the Waste Treatment Industry Questionnaire; data developed for the NOA, as corrected by comments on the NOA data; Dun and Bradstreet's Dun's Market Identifiers (1997) on-line database; the Securities and Exchange Commission's EDGAR database (SEC, 1997); and other financial databases.

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SECTION 3
BASELINE CONDITIONS AND INDUSTRY PROFILE

This section describes the conditions affecting the CWT industry in the absence of regulation. The industry profile section provides an overall description of the CWT industry and the markets for CWT services. Following the industry profile is a discussion of the environmental impacts of the CWT industry at baseline.

3.1 INDUSTRY PROFILE

This section profiles the CWT industry by describing the baseline conditions characterizing facilities supplying CWT services, the companies that own CWT facilities, the demand for CWT services, and the markets for CWT services. The baseline represents the conditions in the CWT industry in the absence of the regulation. Thus, baseline conditions form the basis for comparison with the projected conditions for these entities if the regulation is promulgated as proposed.

3.1.1 Overview of the CWT Industry

The CWT industry developed primarily in response to environmental legislation. A more complete description of the development of the CWT industry is found in the preamble to the proposed rule.

In 1995, there were 205 CWT facilities that accepted waste from off-site sources for treatment or recovery. The wastes sent to CWT facilities tend to be concentrated and difficult to treat and include process residuals, process wastewater, and process wastewater treatment residuals such as treatment sludges. Because of the toxicity of wastes accepted and the limited treatment provided at CWT facilities, CWT facilities discharge high concentrations of some pollutants either into surface water or to publicly owned treatment works (POTWs).

CWT facilities are specialists in waste treatment and may have different relationships with the facilities generating the waste they treat. In terms of these relationships, CWT facilities fall into three main categories:

- commercial: facilities that accept waste only from off-site generators not under the same ownership as their facility.
- noncommercial: facilities that accept waste only from off-site generators under the same ownership as their facility or that accept waste on a contract basis from a small number of adjacent facilities.
- mixed commercial and noncommercial: facilities that treat waste generated by other facilities under the same ownership as their facility and also accept waste from off-site generators not owned by the same company.

In developing the proposed guidelines and standards, EPA looked at facilities that accept waste on a commercial basis and those that accept waste on a noncommercial basis. EPA data show that 201 CWT facilities accept waste on a commercial basis, managing it for a fee. They operate either on a strictly commercial basis or are mixed commercial/ noncommercial facilities. These facilities manage wastes from their own company and also accept some waste from other companies for a fee. The commercial CWT operations plus the commercial share of the mixed CWT facilities constitute the supply of marketed CWT services. The remaining four facilities are classified as noncommercial. Demand for these

CWT services comes from waste generators that do not have the capability to completely treat the waste they generate on-site.

Detailed questionnaire data are available for 76 of these facilities, and limited data from notice comments are available on 69 additional facilities. Weights have been computed and assigned to these 145 facilities to scale up the results to the entire known universe of 205 CWT facilities.

3.1.1.1 Services Provided

CWT facilities provide waste treatment services performed at waste treatment facilities that accept waste from off-site for treatment. CWT services include the treatment and recovery of metal and oil-bearing wastewater and the treatment of organic wastewater. CWT facilities may also transport, incinerate, or otherwise dispose of waste and process residuals.

3.1.1.2 Subcategories

EPA has divided the industry into three subcategories—metals, oils, and organics—based on the types of waste treated or recovered:

- metals subcategory: facilities that accept metal-bearing waste from off-site for treatment or recovery.
- oils subcategory: facilities that accept oily waste from off-site for treatment or recovery.
- organics subcategory: facilities that accept organic waste from off-site for treatment or recovery.

Table 3-1 shows the number of commercial facilities in each industry subcategory offering each type of waste treatment or recovery service. Many CWT facilities offer more than one of the above services and thus fall under more than one industry subcategory.

TABLE 3-1. CWT FACILITIES BY SUBCATEGORY AND CWT SERVICE[a,b]

		Number of Facilities		
Subcategory	**CWT Service**	**Commercial**	**Noncommercial**	**Total**
Metals	Recovery	7		
	Treatment	53		
Total in Subcategory		56	3	59
Oils	Recovery	152		
	Treatment	147		
Total in Subcategory		164	0	164
Organics	Treatment	23	2	25

[a] Facilities are counted as commercial if they treat any waste on a commercial basis. Because many CWT facilities fall under more than one subcategory, the numbers do not add to the total number, 205 facilities, in the CWT industry. Similarly, because more facilities performing metals or oils recovery also perform treatment, the total number of facilities in those categories does not equal the sum of facilities performing recovery and treatment.

[b] Data are scaled up to account for the entire universe of CWT facilities.

3.1.2 Demand for CWT Services

Producing goods and services almost always involves the simultaneous production of waste materials. During the process of manufacturing goods or providing services, the material inputs that are not embodied in the products become waste. Environmental regulations require that these wastes, once generated, be recycled, treated, or disposed of in accordance with regulatory requirements.

The demand for waste management services arises from the generation of waste as a by-product of manufacturing or other production activities. This means that the demand for CWT services is derived from and depends on the demand for the goods and services whose production generates the waste. For example, the higher the demand for plastics, the greater quantity of plastics produced and, in turn, the greater the quantity of by-products of plastic manufacturing that must be treated and disposed of.

Producers generating waste have three choices when they determine how to treat the waste properly. First, they may invest in capital equipment and hire labor to manage the waste on-site, that is, at the site where it is generated. For large volumes of waste, this is often the least expensive way to manage the waste because producers can avoid the cost of transporting it. Some generators may choose to treat waste on-site, because they believe that it will help them control their ultimate liability under environmental laws. Alternatively, producers may choose partially to treat waste on-site and then to send it off-site for ultimate treatment and disposal. This choice is referred to as on-site/off-site in this report. Finally, producers may choose to send waste they generate directly to a CWT facility, a method that is called off-site waste management.

The producers of waste who choose either the on-site/off-site or the off-site method create the demand for CWT services. The proposed guidelines and standards under analysis apply to all facilities accepting waste from off-site for treatment or recovery.

3.1.2.1 Industries Demanding CWT Services

This report used data from the TRI to characterize the generators of hazardous waste by industry and to profile the types of waste treated. A wide variety of manufacturing industries generate waste. Appendix B shows the four-digit Standard Industrial Classification (SIC) codes and the quantities of waste those industries transferred off-site for

either treatment or recycling in 1995. A list of the definitions for SIC codes is provided in Appendix C. The industries transferring the largest amounts of waste off-site for treatment or recycling are blast furnaces and steel mills (3312), storage batteries (3691), nonferrous wire drawing and insulating (3357), plastics materials and resins (2821), motor vehicle parts and accessories (3714), and industrial organic chemicals (2869).

3.1.2.2 Trends in the Demand for CWT Services (TRI)

The data described above reflect the demand for off-site hazardous waste management in 1995. They demonstrate that the demanders of CWT services are diverse and include most manufacturing and many service sectors. The TRI data provide a time series of data on releases of materials. Table 3-2 quantifies the changes in the quantity of wastes transferred off-site for treatment and recycling from 1991 to 1995, based on TRI data over that time period. Waste transferred off-site for recycling increased a total of 41 percent from 1991 to 1995. In contrast, the amount of waste transferred off-site for treatment decreased a total of 3 percent over that time period, although a sudden drop-off from 1991 to 1992 is being offset by more recent increases.

3.1.3 Description of Suppliers of CWT Services

As explained previously, CWT facilities accept waste from off-site for treatment. The generating facility may or may not be owned by the same company as the CWT facility. Suppliers are characterized by commercial status and types of services performed, SIC code, location, size, and RCRA permit status.

TABLE 3-2. TRENDS IN DEMAND FOR OFF-SITE WASTE MANAGEMENT SERVICES

Year	Waste Transferred Off-Site for Recovery (10^6 lbs)	Percentage Change	Waste Transferred Off-Site for Treatment (10^6 lbs)	Percentage Change
1991	1.517	—	244.6	—
1992	1.886	24.33%	215.3	-11.99%
1993	1.940	2.84%	210.3	-2.31%
1994	2.170	11.85%	219.1	4.20%
1995	2.142	-1.27%	237.3	8.31%

Source: U.S. Environmental Protection Agency. Toxics Release Inventory, 1991-1995.

3.1.3.1 Commercial Status

As mentioned earlier, CWT facilities have a variety of relationships with the facilities generating the waste they treat. They fall into three main categories:

- commercial,
- noncommerical, and
- mixed commercial/noncommercial.

Information about commercial status is available from several parts of the Waste Treatment Industry Questionnaire. A copy of this questionnaire can be found in Appendix A of the Economic Impact Analysis report prepared for the earlier proposal (EPA, 1995). Question A35 in the technical section of the questionnaire asks facilities about their overall commercial status.

The part of the questionnaire where the facility reports its costs and revenues indicates its commercial status. In Section N, in the economics section of the questionnaire, facilities were asked to list their commercial waste treatment revenues and costs separately from their noncommercial. Data on commercial revenues were listed in Questions N27 through N29 and noncommercial revenues were listed in Questions N30 through N32. Purely noncommercial facilities reported their costs in Questions N30 through N32, while commercial and mixed facilities reported their costs in Questions N27 through N29. Finally, in Section O, facilities were asked in Question O4 to report the quantities of aqueous liquid waste, sludge, and wastewater they treat that is received from off-site facilities not under the same ownership, that is received from off-site facilities under the same ownership, and that is generated on-site.

Information from Sections N and O forms the primary basis for determining a facility's commercial status. When no data were available, or when the data in Sections N and O conflicted, information from Question A35 was used. Table 3-3 provides the commercial status of the 205 CWT facilities. The characterization of facilities' commercial status in this report refers only to the operations subject to the effluent limitations guidelines and standards. Facilities classified in this analysis as purely commercial may conduct some operations not subject to this proposal on a noncommercial basis. Similarly, facilities classified as noncommercial in this analysis may conduct some operations not subject to this proposal on a commercial basis. The noncommercial category includes four facilities that accept waste from off-site but do not market their CWT services. Included in this category are a facility owned by the federal government and a facility contracted to accept waste from an adjacent generator.

TABLE 3-3. COMMERCIAL STATUS OF CWT FACILITIES[a]

Commercial Status	Number of Facilities
Commercial	201
Noncommercial	4

[a] Data are weighted to account for entire universe of CWT facilities.

Sources: U.S. Environmental Protection Agency. 1991 Waste Treatment Industry Questionnaire. Washington, DC: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. Notice of Availability Facility Information Sheets. Washington, DC: U.S. Environmental Protection Agency.

3.1.3.2 Industry Classification by SIC Code

In the questionnaire, facilities were asked to report the SIC code that best represents the facility's main operation. Table 3-4 shows the SIC codes reported by respondents. EPA assigned all of the Notice of Availability facilities to SIC 4953. The responses give one indication of the relative importance of CWT operations at the facility. No SIC code properly describes CWT services. Facilities that listed 4953, Refuse Systems, as their SIC code are indicating that they are primarily waste treaters. Of the facilities responding to the questionnaire, 51 of 76 indicated that SIC 4953 best described facility operations. SIC code 4953, Refuse Systems, is primarily for municipal waste disposal services, so the majority of facilities in that SIC code are not CWTs but trash haulers and municipal solid waste management facilities.

Facilities that listed other SIC codes are indicating that they are primarily manufacturing facilities that also do some waste management. Three facilities reported 2869, Organic Chemicals not elsewhere classified, and four additional facilities reported other SIC codes in the 2800s, indicating that they are chemicals manufacturers. Four facilities reported SICs in the 3300s, indicating that they are primarily metals manufacturing facilities.

TABLE 3-4. SIC CODES DESCRIBING CWT FACILITIES' PRIMARY OPERATIONS[a]

SIC Code Reported	Number of Facilities
2819	1
2821	1
2834	1
2869	3
2879	1
2911	1
3312	1
3321	1
3341	1
3356	1
3483	1
3499	1
3523	1
3633	1
3679	1
3724	1
3761	1
4226	1
4953	51
5090	1
5170	1
5171	1
9661	1
9711	1
Total	76

[a] Data refer only to facilities responding to the 308 questionnaire.

Therefore, EPA data show that a majority of the facilities expected to be affected by the effluent limitations guidelines and standards are primarily waste management facilities. The rest, although they have CWT services on-site, are primarily manufacturing or service facilities.

It should be mentioned that the North American Industrial Classification System (NAICS) is replacing the existing SIC system. NAICS industries will be identified by a six-digit code, in contrast to the four-digit SIC code, increasing the number of sectors described and therefore increasing the level of detail possible in the industry characterization. SIC 4953, Refuse Systems, is being subdivided into eight new industries. This division will allow differentiation between hazardous waste treatment and disposal (NAICS 562211) and recovering materials (NAICS 56292).

3.1.3.3 Location of CWT Facilities

There are 145 facilities that provided data to EPA through the questionnaire or Notice of Availability. These facilities are located in 38 states. The states with the highest number of waste management facilities are Texas with 13, Ohio with 12, and California with 12. Table 3-5 shows the number of facilities in each state. Because not all CWT facilities offer the same set of services, facilities located near one another may not be in the same markets. Likewise, a CWT facility may compete with facilities located a longer distance away if the services offered are similar. However, questionnaire responses indicated that most CWTs' customers are located within the same state as the CWT or within a few adjacent states. Thus, most of a CWT's competitors will be located relatively close to it.

TABLE 3-5. NUMBER OF FACILITIES PERFORMING CWT SERVICES[a]

State	Number of Facilities	State	Number of Facilities
AL	3	MO	1
AZ	1	MS	1
CA	12	MT	1
CO	2	NC	1
CT	5	NJ	6
DE	1	NV	1
FL	8	NY	4
GA	3	OH	12
HI	1	OK	2
IA	1	OR	2
IL	6	PA	7
IN	4	RI	1
KS	2	SC	2
KY	2	TN	5
LA	3	TX	14
MA	1	VA	5
MD	2	WA	8
ME	1	WI	4
MI	10	WV	1
MN	2	Total	145

[a] Data are not scaled up to account for the entire universe of CWT facilities. These data reflect only the facilities for which data are available.

3.1.3.4 Facility Size

Facility size may be defined in terms of total quantity of waste accepted for treatment or recovery, number of employees, or total revenues and costs. This section examines facility size using quantity of waste accepted and number of employees. Section 3.1.4 discusses facility revenues and costs.

Table 3-6 shows the quantities of wastewater treated by facility size category and discharge status. CWT facilities may

- discharge wastewater, treated or untreated, directly to surface water (direct dischargers);
- discharge wastewater, treated or untreated, indirectly to the sewer system, then to a POTW (indirect dischargers); or
- not discharge their wastewater at all (zero dischargers).

Zero discharge facilities may dispose of their wastewater by pumping it down underground injection wells, evaporating it, applying it to land, selling it or recycling it, or sending it off-site to another CWT facility for treatment.

Facility size can also be defined in terms of employment. Nationwide, EPA estimates that approximately 3,660 full-time equivalent employees (FTEs) work in CWT operations at the CWT facilities. Employment in CWT operations at CWT facilities ranges from 1 FTE to more than 100, with a median of 18 FTEs. The Agency is interested in facility-level employment because, if production falls at a facility as a result of a regulation, some share of the people employed there may become unemployed. This reduction in employment may be magnified throughout the community as facilities that produce goods and services previously demanded by the now unemployed residents experience decreased demand for their goods

TABLE 3-6. FACILITY SIZE CATEGORIES BASED ON QUANTITY OF COMMERCIAL WASTEWATER TREATED, BY DISCHARGE CATEGORY[a]

	Metals Recovery	Metals Treatment	Oils Recovery	Oils Treatment	Organics Treatment or Recovery
Direct dischargers					
< 5 million gallons	1	2	2	3	2
5 million to 10 million gallons	0	0	3	2	0
10 million to 50 million gallons	0	2	0	0	1
50 to 100 million gallons	0	1	0	0	0
Over 100 million gallons	0	1	0	4	0
Total	1	6	5	9	3
Indirect dischargers					
< 5 million gallons	4	25	69	64	11
5 million to 10 million gallons	1	4	28	14	2
10 million to 50 million gallons	0	10	18	15	2
50 to 100 million gallons	0	0	0	0	0
Over 100 million gallons	0	0	0	22	0
Total	5	39	114	115	15
Zero dischargers					
< 5 million gallons	1	7	31	17	4
5 million to 10 million gallons	0	0	0	2	1
10 million to 50 million gallons	0	1	2	0	0
50 to 100 million gallons	0	0	0	0	0
Over 100 million gallons	0	0	0	4	0
Total	1	8	33	23	5

[a] Data are scaled up to account for entire universe of CWT facilities. Counts do not include four facilities that do not treat wastewater commercially.

and services. Table 3-7 shows the number of commercial CWT facilities with various numbers of employees in their CWT operations.

TABLE 3-7. SIZE DISTRIBUTION OF COMMERCIAL CWT FACILITIES BY NUMBER OF CWT EMPLOYEES

Total Number of Employees	Number of Facilities	Percentage
No data	60	33.3%
1 to 9	43	20.9%
10 to 19	33	15.9%
20 to 29	31	14.9%
30 to 49	17	9.0%
50 to 100	13	5.9%
More than 100	4	3.0%
	201	100.0%[a]

[a] Does not sum to 100 percent because of rounding.

3.1.3.5 Facilities Permitted Under RCRA

Some CWT facilities may manage hazardous wastes in operations that are permitted under RCRA. Of the 145 CWT facilities providing data, 79 do not have a RCRA Part B permit, and 66 have a RCRA Part B permit. This distinction is important in part because of what it indicates about the types of wastes the facilities manage and the types of operations they have on-site. All facilities treating hazardous waste are required to have a RCRA permit. Facilities engaged in recycling and recovery operations, such as metals recovery and oils recovery, may or may not have a RCRA permit.

Of direct concern for estimating the impacts of the proposed rule is the fact that facilities having RCRA permits are required to file a modification of their permits whenever their operations change (e.g., when new waste management equipment is installed). Thus, in addition to the costs of purchasing, installing, and operating additional capital equipment to comply with the effluent limitations guidelines and standards, RCRA-permitted facilities will incur the expense of modifying their RCRA permit to reflect these changes.

3.1.4 Baseline Facility Conditions

As described above, this study analyzes the estimated 205 facilities in the CWT industry. Of these, 201 are commercial and four are noncommercial. In this analysis, the Agency accepts the definition of "facility" used by responding CWT facilities. In some cases, the facility is defined as only the waste management part of a plant site. In other cases, the facility is defined as encompassing the entire plant site, including non-CWT operations.

3.1.4.1 Baseline Quantities of Waste Treated

Table 3-8 shows baseline quantities of waste treated by commercial facilities by subcategory. The largest number of facilities and the largest quantities are related to oils treatment and oils recovery. When the responses are weighted to account for nonresponse, 915 million gallons of waste were accepted from off-site recovery of oil. Nine hundred twelve gallons were accepted from off-site for oil treatment.

3.1.4.2 Baseline Costs of CWT Operations

Table 3-9 shows a frequency distribution for the baseline cost of treating waste. The proposed effluent limitations guidelines and standards, if adopted, are expected to increase the cost of treating waste at most CWT facilities. This cost increase, in turn, will increase the

TABLE 3-8. QUANTITY OF WASTE TREATED BY COMMERCIAL FACILITIES, BY SUBCATEGORY (10^3 gal/yr)

	Number of Facilities	Total Quantity (10^3 gal/yr)	Average Quantity (10^3 gal/yr)	Minimum Quantity (10^3 gal/yr)	Maximum Quantity (10^3 gal/yr)
Metals Recovery	7	11,112	1,587	25.9	5,833
Metals Treatment	53	554,413	10,461	0.1	129,340
Oils Recovery	152	746,081	4,895	17.9	47,155
Oils Treatment	145	756,296	5,211	0.1	131,000
Organics Treatment or Recovery	23	95,267	4,142	1.4	23,309

TABLE 3-9. BASELINE WASTE TREATMENT COSTS AT COMMERCIAL CWT FACILITIES[a]

Operating Costs ($1997)	Number of Facilities	Percentage
< $0.1 million	16	8.0%
$0.1 to $1 million	59	29.3%
$1 to $2 million	33	16.4%
$2 to $5 million	26	12.9%
Over $5 million	7	3.5%
No data	60	29.9%
Total	201	100.0%

[a] Data are scaled up to account for entire universe of commercial CWT facilities.

cost of recovery processes because those processes generate wastewater and sludge that must also be treated. These baseline waste treatment cost figures form a basis for comparing the costs of compliance, described in Section 4. Baseline in-scope waste treatment costs at

commercial facilities range from $3,500 to $25 million per facility and total $231 million across all 201 commercial facilities. They average $1.6 million across all commercial facilities.

3.1.4.3 Baseline Revenues for CWT Operations

A frequency distribution of treatment and recovery revenues for commercial CWT facilities is provided in Table 3-10. Treatment and recovery revenues at commercial CWT facilities range from $4,938 to $89.7 million. The average revenue at commercial facilities is $4.4 million.

TABLE 3-10. BASELINE TREATMENT AND RECOVERY REVENUES AT COMMERCIAL CWT FACILITIES[a,b]

Revenues ($1997)	Number of Facilities	Percentage
< $0.1 million	10	5.0%
$0.1 to $1 million	39	19.4%
$1 to $2 million	24	11.9%
$2 to $5 million	39	19.4%
Over $5 million	29	14.4%
No data	60	29.9%
Total	201	100.0%[c]

[a] Includes CWT revenue and revenue from sales of recovered product.
[b] Data are scaled up to account for entire universe of commercial CWT facilities.
[c] Does not sum to 100 percent because of rounding.

3.1.4.4 Baseline Profitability for CWT Facilities

Profitability is not a relevant measure for noncommercial facilities, which are assumed to be treated as cost centers by their companies. EPA's analysis assumes that noncommercial CWT operations are not expected to make a profit, any more than a centralized accounting or legal department is expected to make a profit. Impacts associated with compliance costs for noncommercial facilities will be incurred at the company level. Thus, a company-level financial analysis was performed for these facilities, including an examination of the impacts on company profits. The baseline profits from CWT operations for commercial facilities are described in a frequency distribution in Table 3-11. These profits range from a loss of $6.5 million to a profit of $360 million.

TABLE 3-11. BASELINE PROFITS AT COMMERCIAL CWT FACILITIES[a,b]

Profits	Number of Facilities	Percentage
< $0.1 million	38	18.9%
$0.1 to $1 million	52	25.9%
$1 to $2 million	17	8.4%
$2 to $5 million	16	8.0%
Over $5 million	18	9.0%
No data	60	29.9%
Total	201	100.0%[c]

[a] Profits are total revenues minus total costs.
[b] Data are scaled up to account for entire universe of commercial CWT facilities.
[c] Does not sum to 100 percent because of rounding.

3.1.4.5 Baseline Conditions for Noncommercial Facilities

Four CWT facilities are classified as being strictly noncommercial or contract noncommercial. Although they accept waste from off-site for treatment or recovery, they do not market their CWT services to generators. Instead, their customers are very narrowly defined. The strictly noncommercial facilities accept waste only from facilities owned by the same company as their CWT facility. The contract noncommercial facilities accept waste from a very limited number of adjacent facilities, which they were created to serve. One facility that accepts some waste from off-site on a commercial basis is being considered noncommercial for this report, because it is owned by the federal government. For the purposes of this report, the crucial difference between these facilities and the commercial facilities is how they are assumed to respond to the costs of complying with the CWT effluent limitations guidelines and standards.

The noncommercial facilities are expected to continue to treat whatever waste their customers (whether inside their company or contract customers) generate and to pass the costs of compliance along to their customers. Because strictly noncommercial CWT facilities are generally regarded by their owner companies as providing a service to the rest of the company, the analysis does not assess impacts at the facility level for them. Rather, the analysis assumes that added costs will be borne by the company as a whole. The impacts of the CWT effluent limitations guidelines and standards on strictly noncommercial facilities are assessed at the company level. For the companies owning strictly noncommercial facilities, this will mean that their costs increase by the amount of the costs of compliance and that their revenues do not increase.

Noncommercial CWT operations typically are treated as a cost center for the company and may or may not receive explicit revenues or cross-charges in return for their services. Most frequently, the facilities reported that the facility performed CWT services “at cost” so

that revenues from treatment exactly equaled cost. Other facilities reported receiving no revenue for their services. Total cost accounting, which attributes to a production process all the costs associated with that process, would trace the waste treatment costs back to the production processes where the waste was generated. Most companies, however, have made very little progress in adapting their accounting systems to this approach.

For the contract noncommercial facilities, the customers are not owned by the same company. Instead, generating companies have created the CWT specifically to treat the waste they generate. Like the strictly noncommercial facilities, contract noncommercial CWT facilities treat the waste they receive "at cost" and pass additional costs along to their customers. Because the customers are different companies, the costs and revenues of contract noncommercial facilities are both assumed to increase by the amount of the compliance costs.

At baseline, four CWT facilities are classified as noncommercial. Based on the data available, EPA has identified one of the facilities as contract noncommercial facilities and two as strictly noncommercial, plus one federal facility. Among them, the noncommercial facilities accept 92 million gallons of metal-bearing wastewater per year for treatment and 72 million gallons of organics-bearing wastewater. The companies owning the CWT facilities have annual sales ranging from $6.0 million to $553 million. For the companies owning nonfederal noncommercial facilities for which data are available, the median yearly sales is $177 million.

3.1.5 Baseline Market Conditions

This report characterizes the markets for CWT services using questionnaire data and information gathered in follow-up conversations with facilities and during site visits at several facilities.

3.1.5.1 Defining Regional Markets

For modeling the impacts of the regulation on markets for CWT services, this study divided the contiguous U.S. into six regional CWT markets. In their questionnaire responses, the facilities indicated that, in general, their customers are located within their own state or in a few adjacent states. This pattern is consistent with predictions of economic geography or "location theory," which state that heavy, bulky, or fragile materials or materials otherwise difficult to transport will be traded in localized markets. Wastewater and concentrated oily or metal-bearing wastes are extremely heavy and bulky. Generators therefore want to transport waste as short a distance as possible for treatment and are likely to choose a local CWT facility rather than one located a long distance away, assuming that they offer equivalent services.

As discussed previously, CWT facilities are widely distributed across the country; for modeling purposes, the contiguous 48 states were divided into six regions:

- Northeast: CT, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT
- Northwest: WA, OR, ID, MT, WY
- Southeast: AL, FL, GA, KY, MS, NC, SC, TN, VA, WV
- Southwest: AZ, CA, CO, NM, NV, UT
- Upper Midwest: IA, IL, IN, MN, MI, NE, ND, OH, SD, WI
- Lower Midwest: AR, KS, LA, MO, OK, TX

This definition of regional markets is a simplification of actual markets. Obviously, facilities located along the borders of the "regions" designated in this study may compete with facilities in adjoining regions in addition to competing with facilities in their own

region. The regions were modeled as if they were independent. The presence of other facilities offering the same CWT services in nearby regions would, however, in reality affect the structure of the region's markets for CWT services.

In reality, there are exceptions to the regional pattern. Highly specialized types of waste treatment services, such as precious metals recovery, are offered by only a few facilities nationwide. Markets for these services may be national. In general, however, markets for CWT services are regional.

3.1.5.2 Defining Markets for Specific CWT Services

In the market model, facilities are identified as offering one or more of five broad categories of CWT services:

- metals recovery,
- oils recovery,
- treatment of metal-bearing waste,
- treatment of oily waste, and
- treatment of organic waste.

The first two types of CWT services may result in the production of a salable product. They also result in the generation of wastewater. Under the general category of wastewater treatment, facilities may treat any or all of the following: metal-bearing wastewater, oily wastewater, or organics-bearing wastewater. These three types of wastewater treatment require different treatment processes and have different prices. Thus, these services are traded in separate markets.

As noted above, within the broad types of treatment, considerable variation exists depending on the specific characteristics of the wastes being treated. Wastes with differing characteristics may require more treatment chemicals, for example, or more steps in the treatment process, although the basic overall type of treatment is the same. To reflect the complexity of these markets, each overall type of treatment or recovery can be broken into as many as three submarkets, based on the per-gallon cost of treatment. This is based on the assumption that different per-gallon costs of treatment reflect the different treatments required by differing waste characteristics. Thus, facilities with similar per-gallon treatment costs are assumed to treat similar wastes. The modeling approach assumes that each facility treats waste of a single type within each broad treatment category with a uniform per-gallon cost of treatment. This modeling approach is a simplification. In fact, different batches of wastes treated at a single facility vary in type and therefore in cost of treatment. As modeled, each facility offers at most only a single cost level of each broad treatment category. Data did not permit further detail in the delineation of the types of CWT services offered and their associated costs at each facility.

As the markets are defined, the number of facilities competing in each market varies considerably. Table 3-12 presents the number of facilities offering each type of CWT service by region.

3.1.5.3 Defining Market Structure

Markets in the model are defined as monopoly, duopoly (two sellers), or perfect competition, depending on the number of sellers. Competitive markets are characterized by large numbers of suppliers, none of which are able to exert substantial market power. In a perfectly competitive market, suppliers would decide the most profitable quantity of waste to

TABLE 3-12. BASELINE CONDITIONS IN REGIONAL MARKETS FOR CWT SERVICES[a]

	LM	NE	NW	SE	SW	UM
Number of CWT Facilities	21	27	11	29	16	38
Metal Recovery—Medium Cost						
Market price ($1997 per gallon)	$0.00	b	$0.00	b	b	b
Market quantity (gallons)	0	b	0	b	b	b
Number of CWT facilities	0	1	0	1	1	1
Metal Recovery—Low Cost						
Market price ($1997 per gallon)	b	$0.00	$0.00	$0.00	b	$0.00
Market quantity (gallons)	b	0.0	0.0	0.0	b	0.0
Number of CWT facilities	1	0	0	0	2	0
Metal Wastewater Treatment—High Cost						
Market price ($1997 per gallon)	b	b	b	$0.00	$1.52	$0.00
Market quantity (gallons)	b	b	b	0.0	1,832,803.0	0.0
Number of CWT facilities	1	1	1	0	3	0
Metal Wastewater Treatment—Medium Cost						
Market price ($1997 per gallon)	b	$0.00	b	$0.00	b	$1.07
Market quantity (gallons)	b	0.0	b	0.0	b	5,753,306.0
Number of CWT facilities	1	0	1	0	1	3

(continued)

TABLE 3-12. BASELINE CONDITIONS IN REGIONAL MARKETS FOR CWT SERVICES (CONTINUED)

	LM	NE	NW	SE	SW	UM
Metal Wastewater Treatment—Low Cost						
Market price ($1997 per gallon)	$0.09	$0.44	$0.37	$0.27	$0.17	$0.25
Market quantity (gallons)	84,713,436.7	224,006,899.1	14,692,835.6	39,463,659.0	43,657,238.0	134,339,267.7
Number of CWT facilities	5	13	4	3	5	11
Oil Recovery—High Cost						
Market price ($1997 per gallon)	$0.53	$0.74	b	b	$0.00	$0.95
Market quantity (gallons)	4,444,452.0	7,812,033.9	b	b	0.0	692,104.0
Number of CWT facilities	3	3	1	1	0	3
Oil Recovery—Medium Cost						
Market price ($1997 per gallon)	$0.29	$0.34	$0.28	$0.43	b	$0.32
Market quantity (gallons)	21,692,945.0	28,879,507.3	5,832,143.0	16,663,527.9	b	21,358,335.0
Number of CWT facilities	5	6	3	9	2	5
Oil Recovery—Low Cost						
Market price ($1997 per gallon)	$0.23	$0.18	$0.20	$0.18	$0.20	$0.21
Market quantity (gallons)	23,773,693.6	49,715,050.0	18,657,438.0	62,192,823.0	71,651,643.0	113,175,471.0
Number of CWT facilities	4	5	4	16	5	20

(continued)

TABLE 3-12. BASELINE CONDITIONS IN REGIONAL MARKETS FOR CWT SERVICES (CONTINUED)

	LM	NE	NW	SE	SW	UM
Oil Wastewater Treatment						
Market price ($1997 per gallon)	$0.69	$0.36	$0.37	$0.35	$0.64	$0.23
Market quantity (gallons)	151,851,211.0	58,934,552.0	2,994,797.8	86,998,499.0	65,141,513.0	74,204,993.7
Number of CWT facilities	13	12	6	27	10	31
Organics Wastewater Treatment—High Cost						
Market price ($1997 per gallon)	b	$0.41	$0.00	$0.00	b	$0.00
Market quantity (gallons)	b	10,346,493.6	0.0	0.0	b	0.0
Number of CWT facilities	1	5	0	0	1	0
Organics Wastewater Treatment—Low Cost						
Market price ($1997 per gallon)	$0.18	b	b	$0.24	$0.00	$0.25
Market quantity (gallons)	13,066,578.5	b	b	12,056,117.8	0.0	14,977,678.2
Number of CWT facilities	5	2	2	3	0	4

[a] Data are not scaled to reflect the entire universe of CWT facilities.
[b] To avoid revealing proprietary information, this table does not report prices or quantities in imperfectly competitive markets.

treat based on the given market price. Because of the large numbers of CWTs in the oils recovery and oily wastewater treatment markets, these markets are likely to be perfectly competitive. Thus, the model was designed so that it would allow either a perfectly competitive market structure or imperfect competition. In this modeling approach, any market with more than three sellers is defined as perfectly competitive. In reality, in markets with fewer than eight or ten sellers, suppliers are probably able to exert some influence on the outcomes of market negotiations and to consider their rivals' behavior in forming their decisions related to price and quantity. However, the current modeling approach does not allow that market structure.

3.1.5.4 Substitutes for CWT Services

The existence of substitutes for CWT services influences the responsiveness of the demand for CWT services to changes in their price. Non-CWT facilities also produce goods and services that may be substitutes for the goods and services produced by CWT facilities. For example, waste-generating facilities may decide to construct treatment units on-site; thus, on-site waste treatment would be substituted for CWT. Underground injection wells and other activities that would not be subject to these effluent limitations guidelines and standards can be substituted for regulated types of CWT. In most of these cases, the non-CWT goods and services are not perfect substitutes for the goods and services produced by CWT facilities. Nevertheless, when the cost of CWT-produced commodities increases, some consumers of these goods and services may choose to substitute the other goods and services, which are now relatively cheaper.

The increased cost of waste treatment may also induce some demanders of CWT services to choose another type of substitution. They may modify their processes, essentially substituting additional capital equipment, materials, and labor upstream in their production processes for waste treatment. In other words, some generators may employ pollution

prevention to reduce their demand for CWT services. This type of substitution would result in smaller quantities of waste being generated per unit of the primary product produced. As reported in Section 3.1.2, the declining quantity of waste sent off-site for treatment suggests that pollution prevention is already reducing the demand for CWT services.

3.1.5.5 Baseline Market Prices and Quantities of CWT Services

Table 3-12 also shows the baseline market prices and quantities of CWT services as defined by the model. As described above, facilities offering CWT services within a region were grouped into markets according to the type of service offered and the cost of treatment. For each market, a baseline price was determined. In practice, some facilities price each batch treated based on laboratory tests on the waste in the batch, but the model assumes that all batches treated by a facility in a given subcategory are similar and would have a single price. The baseline price depends on the demand elasticity assumed for the market and on information from the questionnaire, plus comments on the proposal and NOA. The baseline market quantities are the summed facility quantities as reported in the technical part of the questionnaire, plus comments on the proposal and NOA.

3.1.6 Company Financial Profile

New effluent limitations guidelines and standards for CWT facilities will potentially affect the companies that own the regulated facilities. The CWT facilities described in Section 3.1.3 are the location for physical changes in treatment processes. They are the sites with plant buildings and equipment where inputs (materials, energy, and labor) are combined to produce outputs (waste treatment services, recovered metals, organics or oils, and treatment residuals). Companies that own the CWT facilities are legal business entities that have the capacity to conduct business transactions and make business decisions that affect the

facility. It is the owners of the companies that will experience the financial impacts of the regulation.

Potentially affected companies include entities owning facilities that accept waste from off-site for treatment in CWT processes and that generate wastewater in their waste treatment process. These facilities are classified as indirect, direct, or zero dischargers. Frequently, the immediate facilities are in turn subsidiaries of larger companies that generate much of the waste they receive from off-site. The Agency has determined that the appropriate context for assessing the potential financial impact of the regulation is at the highest level of corporate ownership.

Questionnaire and NOA comment data were submitted for only 145 of the estimated 205 CWT facilities. The company-level financial profile is based on the companies owning these 145 facilities, and scaled up to represent the universe of companies owning CWT facilities. These 145 facilities are owned by 114 individual companies and the federal government. Company-level information is available for 100 of the 145 CWT facilities for which the Agency has data. For facilities that responded to the Waste Treatment Industry Questionnaire, company data are based on their responses to Section M of the questionnaire, adjusted to 1997 dollars using the producers price index. For facilities identified in the NOA, company data represent either data provided in comments on the NOA or data EPA developed from public financial databases. Four of the 145 facilities are noncommercial, including a government-owned facility administered by the U.S. Navy. Discussion of the government-owned facility is omitted from this section. Also omitted is a noncommercial facility for which no facility or company financial data are available. The 100 facilities with reliable company data are owned by 74 companies.

For the remaining 43 facilities, for which no reliable company data are available, EPA, for purposes of this analysis, assumed that company revenues equal the revenues of the

CWT facilities owned by the company. This assumption has several possible consequences for the analysis, which are described below. These 43 facilities are owned by 40 companies. Thus, the financial analysis is based on 114 companies.

To obtain an estimate of the universe of companies owning CWT facilities, EPA has scaled up the responses of the 114 companies for which it has data, using the scaling factors developed for the NOA data. Companies owning facilities that submitted 308 questionnaires, and companies owning both NOA and questionnaire facilities, receive a scaling factor of 1. Companies owning only direct discharging NOA facilities receive a scaling factor of 2. Companies owning only indirect discharging NOA facilities receive a scaling factor of 1.877551. Companies owning only zero discharge NOA facilities receive a scaling factor of 1.833333. A few companies own both zero and indirect discharging NOA facilities. These companies receive the scaling factor for the indirect discharging category. Applying these scaling factors, EPA estimates that 164 companies own the estimated 205 CWT facilities.

Table 3-13 presents a size distribution of potentially affected companies and highlights the effect of assuming company revenues equal CWT revenues for the 40 companies for which no reliable company data are available. The table clearly shows that the companies with assigned revenues tend to be smaller on average than companies for which data are available. This may in part be the case because smaller companies are less likely to be found in published financial databases. It is also possible that some of the 40 companies have sources of revenue beyond their CWT revenues, but the Agency has not been able to identify those sources or estimate their revenues. Thus, for the 40 companies for which CWT revenues are assumed to be equal to company revenues, there may be some underestimation of company revenues.

The assumption that these 40 companies have company revenue equal to facility revenue may have several consequences. This assumption may understate company revenues

TABLE 3-13. SIZE DISTRIBUTION OF POTENTIALLY AFFECTED COMPANIES

	Company Revenues	Number of Companies	Median Revenue	Minimum Revenues (10^6 $1997)	Maximum Revenues (10^6 $1997)
a.	Size distribution of companies for which the Agency has reliable data				
	$6 million or less	24	2.5	0.2	5.6
	$6 to $20 million	15	12.8	6.5	19.0
	$20 to $50 million	10	37.5	23.1	45.6
	$50 to $500 million	12	169.2	74.3	426.0
	Over $500 million	12	2,216.1	657.2	40,411.2
b.	Sales distribution of all companies, including those for which company revenues are assumed to equal CWT revenues				
	$6 million or less	51	2.0	<0.1	5.6
	$6 to $20 million	26	12.6	6.2	20.0
	$20 to $50 million	10	37.5	23.1	45.6
	$50 to $500 million	14	156.9	61.7	426.0
	Over $500 million	12	2,216.1	657.2	40,411.2
c.	Sales distribution of all companies, scaled up to reflect the universe of companies owning CWT facilities				
	$6 million or less	82	2.0	<0.1	5.6
	$6 to $20 million	35	12.1	6.2	20.0
	$20 to $50 million	13	37.4	23.1	45.6
	$50 to $500 million	19	168.3	61.7	426.0
	Over $500 million	15	1,785.0	657.2	40,411.2

Note: Does not include one facility owned by the federal government, and another for which no financial data are available.

because they may have other revenues for which EPA has no information. If company revenues are understated, then some of the companies that EPA has classified as small may be misclassified (as shown in Table 3-13, 27 of the companies that EPA has assumed to have company revenues equal to facility revenues have revenues of $6 million or less). Finally, some of the economic impacts of the proposal may be overstated. However, EPA has concluded that its assumption, although conservative, is the most reasonable one to make.

As described above, the Agency scaled up the information on the companies owning NOA facilities to represent the entire universe of companies owning CWT facilities, using scaling factors developed to scale up facility-level data from the NOA. While the Agency recognizes that the scaling is based on facility information and that scaling up the company data may not be entirely accurate, the Agency believes that the companies owning CWT facilities with data provide the best source of information about the characteristics of the companies owning CWT facilities without data. After scaling up, the Agency estimates that the 205 CWT facilities are owned by 164 companies. Table 3-13 also shows the scaled up number of companies owning CWTs by baseline revenue categories. It is evident from comparing the scaled up counts in Table 13-3(c) with the unscaled counts in Table 13-3(b) that the companies owning NOA facilities, which are scaled up, are generally smaller than the questionnaire companies, which are not scaled up. Scaling up the company data increases the estimated number of small companies by 61 percent, from 51 to 82, while scaling up only increases the estimated number of companies in the largest size category by 31 percent. The following discussion uses scaled-up company counts.

Potentially affected companies range in size from companies with less than $100,000 in revenues to companies with nearly $40 billion in revenues. Eighty-two of 164 companies analyzed have sales less than $6 million per year. While EPA is concerned about economic impacts to all companies owning CWT facilities, impacts to these small companies are of particular concern. Under the Regulatory Flexibility Act, EPA must prepare an initial

regulatory flexibility analysis if a proposal will have a significant impact on a substantial number of small companies. While the number of small companies affected by the CWT effluent limitations guidelines and standards is relatively small in absolute terms (EPA estimates fewer than 70 small companies owning direct and indirect dischargers will be affected by the rule), impacts on individual companies owning CWT facilities may be sizeable.

The two ratios examined in this analysis to determine companies' financial status are profit margin and return on assets (ROA). They are defined as follows:

Profit Margin	=	Profit/Revenues
ROA	=	Profit/Assets

The profit margin shows what percentage of every sales dollar the firm was able to convert into net income. This shows how profitable the companies' current operations are. Return on investment relates net income to total assets, measuring how profitably a firm has used its assets. Generally, profit data are available for many of the companies owning CWT facilities, but asset data are not available for the NOA facilities. Thus, the ROA more accurately reflects baseline company financial performance for the companies owning questionnaire CWT facilities.

Table 3-14 shows the baseline financial condition of companies owning CWT facilities. At baseline, companies owning CWT facilities are generally profitable. However, a total of 14 companies are unprofitable at baseline, and they include companies in all size categories except the largest one. Overall profitability appears highest for the smallest and largest companies; the median profit margin for small companies is 18 percent, and the largest size category of companies has a median baseline profit margin of approximately

TABLE 3-14. BASELINE COMPANY FINANCIAL PROFILE, BY COMPANY SIZE

Company Size	Number of Firms	Firms with Asset Data	Company Revenues (10^6 $1997)	Company Profits (10^6 $1997)	Profit Margin	Return on Assets
Less than $6 million	82	8				
Minimum			0.02	-7.37	-2.375	-0.347
Median			2.0	0.28	0.307	0.079
Maximum			5.6	4.13	1.070	16.130
$6 million to $20 million	35	9				
Minimum			6.2	-10.1	-0.532	-0.107
Median			12.1	0.68	0.067	0.107
Maximum			20.0	13.32	0.765	0.696
$20 million to $50 million	13					
Minimum			23.1	-7.02	-0.188	0.035
Median			37.4	1.31	0.021	0.104
Maximum			45.6	5.17	0.198	0.833
$50 million to $500 million	19	6				
Minimum			61.7	-6.86	-0.032	-0.258
Median			168.3	6.14	0.016	0.032
Maximum			426.0	81.98	0.443	0.348
Over $500 million	15	4				
Minimum			657.0	13.66	0.021	0.034
Median			1785	268.3	0.088	0.112
Maximum			40,410	9,852	0.265	20.751

10 percent. For companies ranging in size from $20 million to $500 million, baseline median profit margins are in the 3 percent range.

Median return on assets (ROA) is highest for the largest size category, approximately 18 percent. Like profit margin, the ROA varies across size categories, but in this case, the three smallest size categories, which cover companies up to $50 million in sales, have median ROAs in the 10 percent range. Among companies with sales ranging from $50 to $500 million, the baseline ROA is only 3.5 percent.

3.2 BASELINE ENVIRONMENTAL IMPACTS OF THE CWT INDUSTRY

This section focuses on the specific pollutants that originate from CWT facility effluents and the waterbodies affected by these pollutants. We characterize these pollutants and the affected streams reaches.

3.2.1 Pollutants Discharged

Over 100 hazardous chemical compounds have been detected in the discharges from the 119 modeled CWT facilities. These compounds include inorganic compounds such as arsenic, chromium, and lead, as well as organic compounds such as benzene and toluene. Table 3-15 lists each of the 128 detected chemicals and provides information about their toxicity. Four of the chemicals are known to be human carcinogens and another 17 are considered probable or possible carcinogens. Almost half of the chemicals are considered systemic toxicants for humans. That is, evidence shows that above certain thresholds of exposure they have the potential to damage human health, including neurological, immunological, circulatory, or respiratory effects. These exposure thresholds are represented by the reference dose (RfD) values reported in Table 3-15. Section 9.4.2.3 provides more details on the human health effects of these chemicals.

TABLE 3-15. CATEGORIZATION OF CWT INDUSTRY POLLUTANTS

CAS Number	Pollutant	Slope Factor Value (mg/kg-day)-1	Weight-of-Evidence Classification[a]	Reference Dose (RfD) (mg/kg-day)	Ambient Water Quality Criteria			
					Human Health		Freshwater Aquatic Life	
					Ingesting Water and Organisms Value (µg/l)	Ingesting Organisms Only Value (µg/l)	Acute Value (µg/l)	Chronic Value (µg/l)
630206	1,1,1,2-tetrachloroethane	0.026	C	0.03	1.3	24.4	20,000	10,000
71556	1,1,1-trichloroethane	-	D	0.09	3,100	170,000	42,300	1,300
79005	1,1,2-trichloroethane	0.057	C	0.004	0.61	42	43,000	13,000
75354	1,1-dichloroethene	0.6	C	0.009	0.057	3.2	108,000	8,614
96184	1,2,3-trichloropropane	-	B2	0.006	200	3000	66,500	17,140
120821	1,2,4-trichlorobenzene	-	D	0.01	71.3	89.6	930	286
106934	1,2-dibromoethane	85	B2	-	0.0004	0.013	106,050	35,485
95501	1,2-dichlorobenzene	-	D	0.09	2,700	17,000	1,580	550
107062	1,2-dichloroethane	0.091	B2	-	0.38	99	116,000	11,000
541731	1,3-dichlorobenzene	-	D	-	400	2,600	1,700	763
106467	1,4-dichlorobenzene	0.024	C	-	1.2	8.1	1,120	763
1730376	1-methylfluorene	-	-	-	-	-	541	63
832699	1-methylphenanthrene	-	-	-	-	-	534	40
58902	2,3,4,6-tetrachlorophenol	-	-	0.03	806.3	3,474	1,030	89
243174	2,3-benzofluorene	-	-	-	-	-	576	26
608275	2,3-dichloroaniline	-	-	-	-	-	5,174	517
95954	2,4,5-trichlorophenol	-	-	0.1	487	565	100	63

(continued)

TABLE 3-15. CATEGORIZATION OF CWT INDUSTRY POLLUTANTS (CONTINUED)

CAS Number	Pollutant	Slope Factor Value (mg/kg-day)-1	Weight-of-Evidence Classification[a]	Reference Dose (RfD) (mg/kg-day)	Ambient Water Quality Criteria			
					Human Health		Freshwater Aquatic Life	
					Ingesting Water and Organisms Value (µg/l)	Ingesting Organisms Only Value (µg/l)	Acute Value (µg/l)	Chronic Value (µg/l)
105679	2,4-dimethylphenol	-	-	0.02	540	2,300	2,120	1,970
91576	2-methylnaphthalene	-	-	-	-	-	909	309
612942	2-phenylnaphthalene	-	-	-	-	-	-	-
67641	2-propanone	-	D	0.1	3,500	2,800,000	6,210,000	1,000,000
1576676	3,6-dimethylphenanthrene	-	-	-	-	-	531	12
59507	4-chloro-3-methylphenol	-	-	-	3,000	-	4,050	1,300
108101	4-methyl-2-pentanone	-	-	0.08	2,800	360,000	505,000	56,200
208968	Acenaphthylene	-	D	-	-	-	1,688	665
83329	Acenapthene	-	-	0.06	1,175	2,670	-	23
98862	Acetophenone	-	D	0.1	3,380	97,900	162,000	31,094
98555	Alpha-terpinol	-	-	-	-	-	14,533	5,503
7429905	Aluminum	-	-	-	-	-	748	87
7664417	Ammonia as N	-	-	-	-	-	12,000	2,055
120127	Anthracene	-	D	0.3	4,100	6,800	2.8	2.2
7440360	Antimony	-	-	0.0004	14	4,300	88	30
7440382	Arsenic	1.75	A	0.0003	0.017	0.14	360	190
7440393	Barium	-	D	0.07	1,000	-	410,000	2,813

(continued)

TABLE 3-15. CATEGORIZATION OF CWT INDUSTRY POLLUTANTS (CONTINUED)

CAS Number	Pollutant	Slope Factor Value (mg/kg-day)-1	Weight-of-Evidence Classification[a]	Reference Dose (RfD) (mg/kg-day)	Ambient Water Quality Criteria			
					Human Health		Freshwater Aquatic Life	
					Ingesting Water and Organisms Value (µg/l)	Ingesting Organisms Only Value (µg/l)	Acute Value (µg/l)	Chronic Value (µg/l)
71432	Benzene	0.029	A	-	1.2	71	5,300	530
56553	Benzo(a)anthracene	1.06	B2	-	0.0028	0.031	10	1
50328	Benzo(a)pyrene	7.3	B2	-	0.00013	0.00013	5	0.08
205992	Benzo(b)fluoranthene	1.02	B2	-	0.031	0.352	-	-
207089	Benzo(k)fluoranthene	0.48	B2	-	0.066	0.748	-	-
65850	Benzoic acid	-	D	4	130,000	2,871,800	180,000	17,178
100516	Benzyl alcohol	-	-	0.3	10,000	810,000	10,000	1,000
92524	Biphenyl	-	D	0.05	724	1,235	360	170
117817	Bis(2-ethylhexyl) phthalate	0.014	B2	0.02	1.8	5.9	400	360
2	BOD_5	-	-	-	-	-	-	-
7440428	Boron	-	-	0.09	-	-	-	31.6
78933	Butanone	-	D	0.6	21,000	6,500,000	3,220,000	263,420
85687	Butyl benzyl phthalate	-	C	0.2	3,000	5,200	2,320	260
7440439	Cadmium	-	B1	0.0005	14	84	3.9	1.1
86748	Carbazole	0.02	B2	-	0.96	2.2	2,180	875
75150	Carbon disulfide	-	-	0.1	3,400	94,000	2,100	2
108907	Chlorobenzene	-	D	0.02	680	21,000	2,370	2,100

(continued)

TABLE 3-15. CATEGORIZATION OF CWT INDUSTRY POLLUTANTS (CONTINUED)

CAS Number	Pollutant	Slope Factor Value (mg/kg-day)-1	Weight-of-Evidence Classification[a]	Reference Dose (RfD) (mg/kg-day)	Ambient Water Quality Criteria			
					Human Health		Freshwater Aquatic Life	
					Ingesting Water and Organisms Value (µg/l)	Ingesting Organisms Only Value (µg/l)	Acute Value (µg/l)	Chronic Value (µg/l)
67663	Chloroform	0.0061	B2	0.01	5.7	470	13,300	6,300
7440473	Chromium	-	-	1	33,000	670,000	1,700	210
218019	Chrysene	0.032	B2	-	0.0028	0.031	1,020	102
7440484	Cobalt	-	-	-	-	-	1,620	49
4	COD	-	-	-	-	-	-	-
7440508	Copper	-	D	-	1,300	-	18	12
84742	Di-n-butyl phthalate	-	D	0.1	2,700	12,000	850	500
117840	Di-n-octyl phthalate	-	-	0.02	37.3	39.4	690	69
132649	Dibenzofuran	-	D	-	-	-	1,700	280
132650	Dibenzothiopene	-	-	-	-	-	420	122
124481	Dibromochloromethane	0.084	C	0.02	0.38	4.4	34,000	14,607
60297	Diethyl ether	-	-	0.2	6,900	770,000	2,560,000	79,833
84662	Diethyl phthalate	-	D	0.8	22,631	118,019	31,800	10,000
101848	Diphenyl ether	-	-	-	-	-	4,000	213
122394	Diphenylamine	-	-	0.025	480	1,000	4,760	378
100414	Ethylbenzene	-	D	0.1	3,100	29,000	9,090	4,600
206440	Fluoranthene	-	D	0.04	300	370	3,980	6.2

(continued)

TABLE 3-15. CATEGORIZATION OF CWT INDUSTRY POLLUTANTS (CONTINUED)

CAS Number	Pollutant	Slope Factor Value (mg/kg-day)-1	Weight-of-Evidence Classification[a]	Reference Dose (RfD) (mg/kg-day)	Ambient Water Quality Criteria			
					Human Health		Freshwater Aquatic Life	
					Ingesting Water and Organisms Value (µg/l)	Ingesting Organisms Only Value (µg/l)	Acute Value (µg/l)	Chronic Value (µg/l)
86737	Fluorene	-	D	0.04	1,300	14,000	212	8
7	HEM (and O&G)	-	-	-	-	-	-	-
142621	Hexanoic acid	-	-	-	-	-	320,000	16,437
18540299	Hexavalent Chromium	-	A	0.005	170	3,400	16	11
7439885	Iridium	-	-	-	-	-	-	-
7439896	Iron	-	-	-	-	-	-	1,000
7439921	Lead	-	B2	-	50	-	82	3.2
7439932	Lithium	-	-	-	-	-	-	464
108383	m-xylene	-	-	2	42,000	100,000	16,000	3,900
7439965	Manganese	-	D	0.005	100	-	-	388
7439976	Mercury	-	D	0.0003	0.14	0.15	2.4	0.012
75092	Methylene chloride	0.0075	B2	0.06	4.7	1,600	330,000	82,500
7439987	Molybdenum	-	-	0.005	-	-	-	27.8
68122	n,n-dimethylformamide	-	-	0.1	3,500	200,000,000	7,100,000	2,400,000
124185	n-decane	-	-	-	-	-	18,000	1,300
629970	n-docosane	-	-	-	-	-	530,000	68,000
112403	n-dodecane	-	-	-	-	-	18,000	1,300

(continued)

TABLE 3-15. CATEGORIZATION OF CWT INDUSTRY POLLUTANTS (CONTINUED)

CAS Number	Pollutant	Slope Factor Value (mg/kg-day)-1	Weight-of-Evidence Classification[a]	Reference Dose (RfD) (mg/kg-day)	Ambient Water Quality Criteria: Human Health: Ingesting Water and Organisms Value (µg/l)	Ambient Water Quality Criteria: Human Health: Ingesting Organisms Only Value (µg/l)	Ambient Water Quality Criteria: Freshwater Aquatic Life: Acute Value (µg/l)	Ambient Water Quality Criteria: Freshwater Aquatic Life: Chronic Value (µg/l)
112958	n-eicosane	-	-	-	-	-	18,000	1,300
544763	n-hexadecane	-	-	-	-	-	18,000	1,300
59892	n-nitrosomorpholine	-	-	-	-	-	19,518,012	4,335,749
593453	n-octadecane	-	-	-	-	-	18,000	1,300
629594	n-tetradecane	-	-	-	-	-	18,000	1,300
91203	Naphthalene	-	D	0.04	1,354	41,026	1,600	370
7440020	Nickel	-	-	0.02	610	4,600	1,400	160
136777612	o+p xylene	-	-	2	42,000	100,000	2,600	660
95487	o-cresol	-	C	0.05	1,700	29,900	8,400	1,809
106445	p-cresol	-	C	0.05	1,700	31,000	7,500	2,570
99876	p-cymene	-	-	-	-	-	6,500	130
87865	Pentachlorophenol	0.12	B2	0.03	0.282	8.2	22	13
700129	Pentamethylbenzene	-	-	-	-	-	395	19
85018	Phenanthrene	-	D	-	0.0028	0.031	30	6.3
108952	Phenol	-	D	0.6	21,000	4,600,000	4,200	200
129000	Pyrene	-	D	0.03	228	291	1,010	101
110861	Pyridine	-	-	0.001	35	5,400	93,800	25,000

(continued)

TABLE 3-15. CATEGORIZATION OF CWT INDUSTRY POLLUTANTS (CONTINUED)

CAS Number	Pollutant	Slope Factor Value (mg/kg-day)-1	Weight-of-Evidence Classification[a]	Reference Dose (RfD) (mg/kg-day)	Ambient Water Quality Criteria			
					Human Health		Freshwater Aquatic Life	
					Ingesting Water and Organisms Value (µg/l)	Ingesting Organisms Only Value (µg/l)	Acute Value (µg/l)	Chronic Value (µg/l)
7782492	Selenium	-	D	0.005	170	11,000	20	5
7440213	Silicon	-	-	-	-	-	-	-
7440224	Silver	-	D	0.005	170	110,000	4.1	0.12
7440246	Strontium	-	-	0.6	-	-	-	-
100425	Styrene	-	-	0.2	6,700	160,000	4,020	402
18496258	Sulfide, total	-	-	-	-	-	-	2
10	TDS	-	-	-	-	-	-	-
127184	Tetrachloroethene	0.051	-	0.01	0.8	8.9	4,990	510
56235	Tetrachloromethane	0.13	B2	0.0007	0.25	4.4	41,400	3,400
7440280	Thallium	-	-	-	-	-	1,400	40
7440315	Tin	-	-	0.6	-	-	-	18.6
7440326	Titanium	-	-	-	-	-	-	191
12	TOC	-	-	-	-	-	-	-
108883	Toluene	-	D	0.2	6,800	200,000	5,500	1,000
57125	Total cyanide	-	D	0.02	700	220,000	22	5.2
20	Total phenols	-	-	-	-	-	-	-
156605	Trans-1,2-dichloroethene	-	-	0.02	700	135,000	220,000	110,000

(continued)

TABLE 3-15. CATEGORIZATION OF CWT INDUSTRY POLLUTANTS (CONTINUED)

CAS Number	Pollutant	Slope Factor Value (mg/kg-day)-1	Weight-of-Evidence Classification[a]	Reference Dose (RfD) (mg/kg-day)	Ambient Water Quality Criteria			
					Human Health		Freshwater Aquatic Life	
					Ingesting Water and Organisms Value (µg/l)	Ingesting Organisms Only Value (µg/l)	Acute Value (µg/l)	Chronic Value (µg/l)
75252	Tribromomethane	0.0079	B2	0.02	4.38	421	29,300	13,386
79016	Trichloroethene	-	-	-	2.7	80.7	40,700	100
20324338	Tripropyleneglycol methyl ether	-	-	-	-	-	2,484,600	683,870
9	TSS	-	-	-	-	-	-	-
7440622	Vanadium	-	-	0.007	-	-	11,200	9
75014	Vinyl chloride	1.9	A	-	2	525	79,560	25,144
7440655	Yttrium	-	-	-	-	-	-	-
7440666	Zinc	-	D	0.3	9,100	69,000	120	110
7440677	Zirconium	-	-	-	-	-	-	10.3

[a] Weight-of-evidence classification codes:
A–Human carcinogen
B1–Probable human carcinogen (limited human data)
B2–Probable human carcinogen (animal data only)
C–Possible human data
D–Not classifiable as to human carcinogenicity

Source: U.S. Environmental Protection Agency.

In addition to human health effects, a majority of the 128 chemicals are considered hazardous to aquatic life. To protect aquatic species from potentially lethal chronic and acute exposures, EPA has established pollutant-specific water quality criteria. As reported in Table 3-15, these are expressed as maximum allowable in-stream concentrations. EPA has established similar criteria for the protection human health, which are also reported in Table 3-15.

3.2.2 Affected Streams and Reaches

To analyze water quality impacts, waterbodies have been broken down into discrete geographical segments known as a "reaches." A river network is typically made up of several branches of rivers and streams that come together at various confluence points. In such a network, reaches are defined as the river or stream segments lying between each of these confluence points. For wider bodies of water, a reach is defined as a section of shoreline (EPA, 1994c). Reaches in the U.S. average approximately 10 miles in length. This study has modeled water quality for the reaches affected by pollutants originating from CWT effluents. When data were insufficient for the receiving stream, water quality was modeled for the closest downstream reach with available data.

Table 3-16 provides general characteristics of the affected stream segments, or reaches. The affected reaches are located throughout the country, primarily in urban areas (78 of the 83 reaches). The largest concentrations are found in the northeastern, midwestern, and southeastern regions of the U.S. The majority of the reaches are affected by dischargers in the oils subcategory (55 reaches), followed by the metals subcategory (38 reaches) and the organics subcategory (20 reaches). The sum of the affected reaches in each of these subcategories may be greater than the total number of affected reaches because some reaches receive discharges from more than one subcategory; therefore, they may be included in more than one of the subcategory totals.

TABLE 3-16. CHARACTERISTICS OF REACHES RECEIVING DISCHARGES FROM CWT FACILITIES

	Reaches Affected by Direct Dischargers	Reaches Affected by Indirect Dischargers	Total Affected Reaches
Number of Reaches[a]	10	73	83
Metals subcategory	7	31	38
Oils subcategory	2	53	55
Organics subcategory	3	17	20
Location			
Northeast	5	18	23
Southeast	1	14	15
Upper Midwest	2	20	22
Lower Midwest	2	8	10
Northwest	0	5	5
Southwest	0	7	7
Other	0	1	1
Reaches in Urban Areas	9	69	78
Fish Consumption Advisories	2	20	22

[a] Some reaches receive discharges from more than one subcategory; therefore, the total number of reaches may be less than the total of the subcategories.

Table 3-16 also provides one indicator of the current level of water quality in these reaches. Twenty-two of the reaches are on rivers that currently have fish consumption advisories in place. These advisories are largely due to pollutants such as dioxin, polychlorinated biphenyl (PCBs), and various pesticides, none of which are in the scope of the proposed regulation. Consequently, reductions in CWT pollutants cannot be anticipated

to change these advisories. Nevertheless, these advisories do provide an important indication of the quality and level of use of the reaches.

3.3 REFERENCES

U.S. Environmental Protection Agency. Toxics Release Inventory database, 1991-1995.

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